HOWREY SIMON ARNOLD & WHITE HOWREY ATTORNEYS AT LAW

Serial No.: 09/762035
Confirmation No.: 7442
Applicant: SAWDON et al.
Atty. Ref.: 11836.0695.PCUS00

**REMARKS:**

REMARKS REGARDING CLAIM AMENDMENTS:

The above noted amendments to the claims have been made so that the scope and language of the claims is more precise and clear in defining what the Applicant considers to be the invention. Specifically, the amendment to claims 2 and 3 have been made to more clearly define and close the group of compounds recited in each claim. Claim 6 has been amended to eliminate the dependency on claim 1, that is to say amended claim 6 now specifically recites all of the limitations of claim 1 from which it was previously dependent. In accordance with the principles of 35 U.S.C.§112, 4th paragraph, this amendment to claim 6 in no way changes the scope of the protection sought.

Support for the above amendments to the claims can be found in the original specification as filed.

The claims and amended claims are submitted as being clearly distinct and patentable over the art of record and therefore their entry and allowance by the Examiner is requested.

## IN RESPONSE TO THE OFFICE ACTION:

### FIRST REJECTION UNDER 35 U.S.C. § 112, SECOND PARAGRAPH:

Claims 2 and 3 were rejected under 35 U.S.C. §112, second paragraph as being indefinite and filing to particularly point out the Applicant's invention.

In response, claims 2 and 3 have been amended so as to the specific concerns indicated by the Examiner in the Office Action. Specifically, the amendment corrects the language defining the Markush Group of compounds recited.

Applicant submits that the above amendments obviate the rejection of the claims under 35 U.S.C. §112, second paragraph and thus ask that the Examiner reconsider and withdraw the rejection of the claims and indicate their allowance in the next paper from the Office.

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### FIRST REJECTION UNDER 35 U.S.C. § 102:

Claims 1-4 have been rejected under 35 U.S.C. §102 as being anticipated by U.S. Patent No. 4, 098,997 issued to Martin M. Tessler (the Tessler reference). In response, Applicant requests that the Examiner reconsider and withdraw the rejection in view of the following:

For there to be anticipation under 35 U.S.C. §102, "each and every element" of the claimed invention must be found either expressly or inherently described in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987) and references cited therein. See also *Kloster Speedsteel AB v. Crucible Inc.*, 793 F.2d 1565, 1571, 230 USPQ 81, 84 (Fed. Cir. 1986) ("absence from the reference of any claimed element negates anticipation."); *In re Schreiber*, 128 F.3d 1473, 1477, 44 USPQ2d 1429, 1431 (Fed. Cir. 1997). As pointed out by the court, "[t]he identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). An anticipating reference must describe the patented subject matter with sufficient clarity and detail to establish that the subject matter existed and that its existence was recognized by persons of ordinary skill in the field of the invention. *ATD Corp. v. Lydall, Inc.*, 159 F.3d 534, 545, 48 USPQ 2d 1321, 1328 (Fed. Cir. 1998). See also *In re Spada*, 911 F.2d 705, 708, 15 USPQ 2d 1655, 1657 (Fed. Cir. 1990).

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The Tessler reference teaches a process for crosslinking of starches as indicated in Col. 2, lines 27-33 as being "...any granular starch derived from any plant source including corn, potato, sweet potato, wheat, rice, sago, tapioca, waxy maize, sorgham, high-amylose corn or the like." Alternatively Tessler indicates that any granular amylaceous substance may be used. Col. 2, lines 41-45.

One of skill in the art should understand and appreciate that the starches of Tessler are polysaccharides that have a molecular weight much greater than 30,000. As is indicated in a basic organic chemistry text, (copy attached), starch is a high molecular weight polysaccharide. Starch has two components, amylose (average molecular weight of 10,000,000) and amylopectin, which is highly polymeric and has as many as a million glucose units. A glucose unit has a molecular weight of about 180, thus any molecule with more than about 167 glucose units would exceed the recited molecular weight range.

In contrast the compounds of the present invention are the result of the crosslinking reaction of relatively small molecular weight compounds (i.e. molecular weight less than 30,000).

Applicant submits that the Tessler reference fails to teach or suggest the use of such low molecular weight materials in a crosslinking reaction. Rather, the Tessler reference is concerned about the modification of starches, which as noted above are of a considerably higher molecular weight than what is recited in the claims.

In view of the above, Applicant requests the reconsideration and withdrawal of the rejection of claims 1-4 under 35 U.S.C. §102 and ask that the Examiner indicate the allowance of these claims in the next paper from the Office.

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The undersigned representative requests any extension of time that may be deemed necessary to further the prosecution of this application.

The undersigned representative authorizes the Commissioner to charge any additional fees under 37 C.F.R. 1.16 or 1.17 that may be required, or credit any overpayment, to Deposit Account No. 01-2508, referencing Order No. 11836.0695.PCUS00.

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In order to facilitate the resolution of any issues or questions presented by this paper, the Examiner should directly contact the undersigned by phone to further the discussion.

Respectfully submitted,

Carter J. White
Patent Attorney
Reg. No. 41374
Tel. 713 268 1372
Date: 19 Sep 03

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[redacted]

# Organic Chemistry

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The University of Michigan

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finally isolated is the
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The resulting mixture
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ır.
no potential aldehyde
1 of glucose must be
ase so the glucosidic

e molecule was much
n, started in 1908 and
show that fructose is

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**PROBLEM 14.37** Write the equations that account for the formation of glucosazone from sucrose.

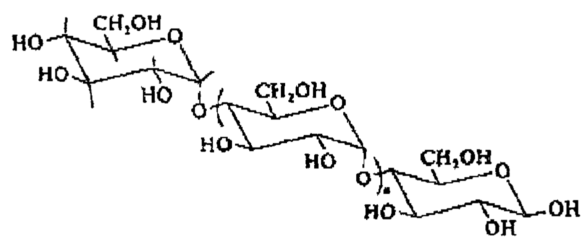
**PROBLEM 14.38** Gentiobiose is a disaccharide found in a number of natural products. It has the formula $C_{12}H_{22}O_{11}$ and is a reducing sugar. It is hydrolyzed by emulsin to glucose. 2,3,4,6-*O*-Tetramethyl-D-glucopyranose and 2,3,4,-*O*-trimethyl-D-glucopyranose are obtained from the conversion of gentiobiose to its fully methylated form, followed by hydrolysis. What is the structure of gentiobiose? Give it a systematic name.

## Polysaccharides

### A. Starch

The two polysaccharides of overwhelming biological and economic importance are starch and cellulose. Plants store their reserve carbohydrates in the form of starch. We get the starch we need from roots, tubers, and seeds.

Starch is a high molecular weight polysaccharide that can be broken down completely to glucose by acid hydrolysis and by the enzyme maltase, which establishes the presence of $\alpha$-linkages. Starch can be fractionated into two different kinds of molecules. One is amylose, which has an average molecular weight of approximately $10^6$. It is primarily a polymeric chain of glucopyranose units attached to each other by $\alpha$-glycosidic linkages between carbon 1 of one glucopyranose and the hydroxyl group on carbon 4 of the next one. The structure of amylose is proved by methylation and hydrolysis, which gives almost exclusively 2,3,6-*O*-trimethylglucose.




amylose
$n \sim 1000$–$6000$

Amylose and iodine form a complex that is blue, hence the familiar color reaction of iodine in starch.

The chief fraction of starch is amylopectin, which has a more complicated structure. It is highly polymeric, with as many as a million glucose units in a single molecule. Complete methylation and hydrolysis of amylopectin gives about 3% of 2,3-*O*-dimethylglucose, suggesting that some glucose units are connected to others through the hydroxyl group at carbon 6 as well as through the oxygens at carbons 1 and 4. Enzymatic studies and partial hydrolysis reactions have shown that amylopectin has a randomly branched structure in which the hydroxyl groups at carbon 6 of some glucose units are indeed involved.

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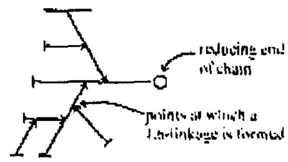


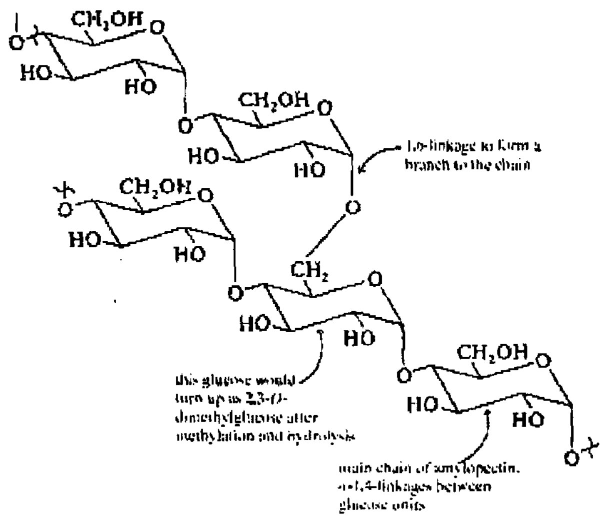


*amylopectin, showing the branching of the chain*

The branching seems to occur every 20 to 25 glucose units. The overall structure of amylopectin is like the branching of a tree.

Glycogen, the form in which animals store carbohydrates, is also composed of glucose units and is similar to amylopectin in structure except that the branching occurs at shorter intervals, with about 12 glucose units in each branch. It has been isolated from kidneys, brains, and skeletal and cardiac muscles of mammals and is especially abundant in the liver.

## B. Cellulose

Cellulose is the organic substance that is most abundant in nature. It is the structural material of the higher plants and is found in all parts of plants. Wood is about 50% cellulose. Commercially important fibers such as cotton and flax consist almost completely of cellulose.

On hydrolysis, cellulose gives cellobiose and ultimately glucose. This establishes its structure as a linear chain of glucopyranose units attached to each other by $\beta$-glycosidic linkages from carbon 1 of one unit to the hydroxyl group on carbon 4 of another unit. The structure consists of long chains of six-membered rings in the most stable chair conformation with all the larger substituents in the equatorial positions.